

Doctrine and Organization for Determining the Ethics of Human Performance Enhancement

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ABSTRACT

The formation of HPE ethics should spring from human performance doctrine and an appropriate organization for collecting, collating, and analyzing HP information with concomitant authority to make ethical decisions. The ethical utility of HPE technology for the human weapon system should be considered at the earliest opportunity when developing CONOPS and integrating the human into weapon systems. Too often, science offers a technology that is pressed into service devoid of doctrinal guidance or the benefit of accrued operational information resulting in an ethically slippery slope. Inadequate Human Systems Integration or weak CONOPS leads to the default of “enhancing” the human – extending the human beyond established and sustainable limits because of failure to understand the role of the human in the system (e.g., pharmaceutical enhancement of alertness during a 40 hour flying mission). An overarching approach to HPE mitigates the need for enhancement where possible and provides a life-cycle perspective to the ramifications of enhancement – to the individual and to society. A doctrinal and organizational framework for ethical HPE provides the capacity for consensus. The DoD and NATO should pursue 1) a common HP doctrine, 2) a code that balances ethics with the need for superior weapon systems, 3) the means for longitudinal surveillance of those exposed to HPE agents, and 4) a definition, based on evidence, of minimum standards for assessing the effectiveness and safety of HPE modalities.

1.0 INTRODUCTION

The application of technology to enhance human performance is proceeding apace in nanotechnology, biomedicine, information technology, and cognitive science (NBIC). As NBIC technologies converge, scientists are entertaining profound human enhancements such as direct links between the brain and machines, making the body more resilient and impervious to stress and environmental threats, and even going so far as to propose humans as cyborgs – semi-human and semi-machine [1]. As one might imagine, bioethicists have taken a keen interest in the emerging NBIC technologies over the question of whether there should be “engineering of the mind and of the body” versus “engineering for the mind and for the body” [2].

Nowhere is human performance enhancement more important than in military operations. Dependence on a global information grid with broad-band information flow demanding almost instantaneous decision-making and global situational awareness; exposure to weapons effects, whether blast or biological; and operations demanding human performance beyond physiological limits make any means of enhancing the human tantalizingly desirable. In fact, the US Department of Defense (DoD) has embraced the need for human performance enhancement (HPE). The Joint Forces Health Protection Concept of Operations (CONOPS) lists Joint Human Performance Enhancement as a function to manage fatigue; enhance sensory, cognitive, and motor capabilities; enhance learning, communications, and decision making; and enhance physiological capability. However, the ethics of HPE is not mentioned in the document. But with some prescience, we can appreciate the pressing need to stay ethically ahead of HPE technology. By way of illustration, during

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Operation Iraqi Freedom, B-2 stealth bomber pilots flew non-stop combat missions from Whiteman AFB, Missouri, averaging 35.3 hours per sortie. Missions to Afghanistan reached a maximum sortie length of 44 hours. Each crew of two pilots used fatigue countermeasures consisting of preflight zolpidem and in-flight use of napping, caffeine, or dextroamphetamine [3]. How did USAF leadership arrive at a concept of operations that extended a two-man crew of a \$2.1 billion aircraft well beyond their physiological limits, resorting to pharmacological enhancement of alertness with unknown total life risk to the aircrews? More to the point, what was the HPE ethical framework for deployment of airpower in this manner?

2.0 DOCTRINE AND ORGANIZATION

In his seminal book, *Ideas and Weapons*, Dr. I. B. Holley studied the use of United States airpower during World War I, examining in detail the exploitation of aerial weapon technology. He concluded that the US was at a disadvantage when leaders failed to develop doctrine and, furthermore, lack of doctrine was directly attributable to inadequate organization in two capacities – information and decision. Without the organizational means of systematically accumulating objective evidence on aerial warfare and without agencies to make decisions based on the evidence rather than opinion and limited experience, the US forfeited the dynamic relationship between doctrine and aerial technological innovation [4]. We are in cataclysmic danger of committing the same error today. The ethical employment of HPE should not occur devoid of human performance doctrine informed by the orderly accrual and analysis of operational information. If we fail to do so, there will be willy-nilly adoption of nano-, bio-, info-, cogno-technology leading to a host of unintended, and unimaginable, consequences.

3.0 HUMAN PERFORMANCE DOCTRINE

A holistic approach to human performance doctrine must be taken in order to sustain the human throughout a military career, to integrate the human in weapon systems, and to apply technology to enhance the human. One concept proposed for human performance doctrine [5] divides human performance into three interlinked categories:

- Human performance sustainment – maintains target performance levels throughout a military career while minimizing total life-cycle costs
- Human performance optimization – ensures efficient use of limited human resources in military systems through the process of human systems integration (HSI)
- Human performance enhancement -- enables the human to operate beyond established and sustainable performance thresholds, achieved primarily through science and technology

The application of a capabilities-based, total life-cycle view of the human provides the means for strategists, planners, acquisition managers, and commanders to successfully and ethically develop and employ weapon systems. The lack of human performance doctrine results in disintegration of human-centric systems and CONOPS and forces a default of enhancing the human; that is, extending the human beyond established and sustainable limits because of failure to understand the role of the human in the system. This is not to say that HPE is inherently undesirable or unethical; rather, doctrine causes us to consider the ethical principles of autonomy, nonmaleficence, beneficence, and justice when contemplating the employment of the human weapon system [6]. HPE may be completely ethical when applied to, say, increased survivability. Therefore, concomitant with human performance doctrine should be the organizational structure to define ethical constraints commensurate with accepted societal and political bounds.

4.0 ORGANIZATION FOR INFORMATION AND DECISION

There is a real need for an agency sanctioned to gather and analyze the physical, physiological, psychological, and cognitive domains of human performance within the scope of military operations. Such an agency would:

- Accumulate, collate, and analyze lessons learned with emphasis on operations leading to degradation of human performance.
- Establish requirements for scientific research in HPE based on human performance gap analysis.
- Keep a technical watch on world-wide developments in HPE, particularly those of potential adversaries.
- Determine the requirement for long-term health surveillance of individuals exposed to HPE agents.
- Define the minimum standard for assessing the effectiveness and safety of HPE technology.

An initial step toward such an agency in the United States is a human performance optimization (HPO) clearinghouse within the Uniformed Services University Consortium for Health and Military Performance (CHAMP). The avowed purpose is to “maintain a comprehensive and accessible repository of information on HPO; provide educational and training processes for learning about and applying evidence-based HPO in practice; provide systematic, responsive and dynamic processes for mission specific information exchange and training between warfighters/commanders and scientific investigators on HPO [7].” But this is just a beginning – there needs to be a concerted, concentrated effort to achieve a mature organizational construct for human performance.

Embedded within or closely affiliated with an office of human performance should be an office of HPE ethics responsible for:

- Understanding and interpreting the political, cultural, sociological, religious, and legal determinants of ethical behaviour as a guide to ethical HPE in military operations.
- Establishing guidelines and sound criteria for ethical use of performance enhancing technologies.
- Establishing a code, in collaboration with political, military, scientific, and medical leadership, that balances ethical HPE with the need for superior military weapon systems.

Evidence of the need for such an office is the recent charter of the Army Center of Excellence for the Professional Military Ethic located at the US Military Academy at West Point. Formed to “ensure that our core values and ethos remain strong in the face of repeated deployments and the challenges of modern, complex battlefields”, the center upholds “the system of moral standards and principles that define our commitment to the Nation and the way we conduct ourselves in its service”[8]. In like manner, a center for ethical HPE should be established at the Department of Defense level, perhaps an expansion of the existing Standards of Conduct Office.

The need for ethical guidelines in HPE has been anticipated for enhancing cognition. Published in a supplement to *Aviation, Space and Environmental Medicine*, the author proposed four test questions to

determine ethical use of pharmaceuticals: 1) Are we certain the use of the compound is truly informed and voluntary; is an individual soldier requesting the medication with full understanding of its purpose and potential adverse effects? 2) Are we certain the medication itself is safe for the individual and safely used within the environment? 3) Is the use of the compound consistent with its dosage and pharmacological function; and 4) Have non-pharmacologic alternatives been fully utilized [9]? A similar process must be in place to provide ethical guidance in the use of other evolving enhancement modalities such as nanotechnology.

Having organized for information, inherent in the organization should be the authority to make decisions that set forth binding policy. Additionally, evidence-based decisions that have been ethically tempered will modify human performance doctrine so that it does not become anachronistic as technology changes the way the human is sustained, optimized, and enhanced.

5.0 CONCLUSION

So, what must we do? The rapid advancements in nanotechnology alone should compel us to avoid a headlong, all-embracing approach to HPE, but rather advance with circumspection. Brain-machine-interfaces, brain to brain communication (techlepathy), neural signals transmitted by nano-wires, and neuronally sensed wireless communications [10] are just a few potential technologies demanding ethical foresight in military applications. Performance enhancing technologies currently used by military forces such as pharmaceutically enhanced alertness to offset physiological fatigue are not without ethical dilemmas. Studies of off-label use of drugs in a healthy population, if done at all, lack statistical power to determine the risk of adverse events, invoking the need for long-term, prospective surveillance of military personnel exposed to HPE agents [11]. There must be an overarching approach to HPE that mitigates the need for enhancement where possible and provides a life-cycle perspective to the ramifications of enhancement, both to the individual and to society.

A doctrinal and organizational framework for ethical HPE sets the stage for consensus. Therefore, DoD and NATO should pursue 1) a common human performance doctrine, 2) a code that balances ethics with the need for superior weapon systems, 3) the means for longitudinal surveillance of those exposed to HPE agents, and 4) a definition, based on evidence, of minimum standards for assessing the effectiveness and safety of HPE modalities.

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